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ABSTRACT

Florida's decisionmakers need usable methods of obtaining information on the likely future demands their higher educational systems will have to meet. An analysis is made to provide the information and focuses on the problems of predicting freshman enrollment in the state's public colleges and universities, with particular attention given to the transition from high school to college. There is also an analysis of data sources available in Florida to identify the kinds and quality of data that can be obtained from each source as well as the gaps in the available data and information required to establish enrollment rates and patterns not contained in any available source. A model for combining the data available is developed. Finally, ways in which policymakers can use these methods to assess the enrollment implications of alternative policies and to rapidly identify emerging problems in their higher education system is identified. Results are used to project 1972 freshmen enrollment by institution. Essentially, what is being predicted is how the development of a new institution would impact on the distribution of freshmen enrollment in Florida. The steps Florida would have to take to use these methods to anticipate the enrollment implication of changes in other policy variables are also discussed. (Author/KE)

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THE TRANSITION FROM HIGH SCHOOL TO COLLEGE: A STUDY OF FRESHMAN ENROLLMENTS IN FLORIDA

PREPARED UNDER A GRANT FROM THE NATIONAL SCIENCE FOUNDATION

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PREFACE

With the support of the National Science Foundation and the cooperation of Florida's State University System and the Planning and Analysis Division of the University of Florida, The Rand Corporation has undertaken an analysis of the college-going rates and patterns of Florida high school seniors. This report presents the results of that analysis.

The objective of the research was to develop methods that decisionmakers in the area of higher education in the state of Florida could use to improve their understanding of students' enrollment decisions, and to project enrollments in the state's colleges and universities. To this end, the authors of this report develop a model of students' transitions from high school to college and show how the model might be used to obtain enrollment projections in public institutions. The model, which is based upon data routinely available in the state, can be updated and revised annually; and the enrollment rates can be re-analyzed to discover emerging trends and changes stemming from policy initiations.

Because it is designed for use with the data systems available in Florida, the model cannot be used in other states. However, the authors are confident that the general approach to the development of the model can be employed elsewhere.

SUMMARY

The objective of this study was to provide Florida's decision-makers with methods they could use to obtain information on the likely future demands their higher educational systems will have to meet. The analysis focused on the problem of predicting freshman enrollments in the state's public colleges and universities, paying particular attention to the transition from high school to college. We investigated two specific questions. What data sources, relevant to students' enrollment decisions, were available? And, how might they be used by policymakers?

We analyze the data sources available in Florida, identifying the kinds and quality of data that can be obtained from each source. Gaps in the available data, and information required to establish enrollment rates and patterns not contained in any available source, are then discussed.

We develop a model for combining the data that are available to estimate the number of students from each Florida high school who enter each public college and university in the state. To demonstrate the model, we use data from 1971 to estimate a transition matrix whose hi^{th} element is the probability that a student from high school h will go on to college i. We then point out how this transition matrix may be used to project freshman enrollments at existing institutions of higher education in subsequent years.

We next develop a method for analyzing the variation in transition probabilities by relating them to students' characteristics and certain characteristics of colleges and universities. Our general approach was to model students' college-going decisions as a two-stage process. In the first stage a choice is offered among four basic "tracks": a state university other than Florida A&M, a public junior college, Florida A&M, and "other." (The last is a residual category which includes students not going on to college, going on to a private, in-state institution, or going on to an out-of-state institution.) The second stage pertains to students entering the first two tracks and consists of a choice of a

specific institution. Again, data from 1971 are used to demonstrate the method.

Finally, we discuss the ways in which policymakers can use these methods to assess the enrollment implications of alternative policies and to rapidly identify emerging problems in their higher education system. We use our results to "project" 1972 freshman enrollments by institution, including Pasco-Hernando Community College which opened that year. In doing so, we essentially predicted how the development of a new institution would impact on the distribution of freshman enrollments in Florida. Our forecast that Pasco-Hernando's initial freshman class would contain 384 students compares favorably with the 406 freshman enrollments it actually realized. We then discuss the steps Florida would have to take to use these methods to anticipate the enrollment implications of changes in other policy variables.

ACKNOWLEDGMENTS

This research was initiated by David Mundel, Harvard University, who brought to our attention the need for analyses of this type and who contributed advice and guidance early in the study. Joseph Stafford, James Burns, and Robert Williams of the Planning and Analysis Division of the University of Florida undertook the acquisition and preliminary processing of the data used in the analysis. We have benefited from the advice and comments of numerous decisionmakers in the area of higher education in Florida; we are particularly obligated to W. Kenneth Boutwell, Vice Chancellor of the State University Systems, and David McOuat, Enrollments Coordinator, for their many useful suggestions. Gus Haggstrom of The Rand Corporation contributed many important ideas, including the shaping of much of the analysis presented herein. We are also indebted to Rand colleagues John Rolph and James Smith, who reviewed an early draft of this report and offered numerous useful comments and suggestions.

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I. INTRODUCTION

This report presents the results of an analysis of the college-going rates and patterns of high school seniors in the state of Florida. The objective of the study was to provide state decisionmakers with a means for obtaining information to plan for future demands on their higher education system. A model, designed for use with routinely available data, is developed to show students' transitions from high school to college, including their choices among Florida's public colleges and universities. We then discuss how the model can be used to provide an understanding of the factors that influence students' enrollment decisions, to rapidly identify departures from past trends in enrollment rates and patterns, and to update and revise short-term projections of enrollments in the state's institutions of higher education.

MOTIVATION FOR THE STUDY

States cannot rely upon the assumption that existing trends in enrollment rates and patterns will be continued far into the future. The accuracy of any set of long-term enrollment projections, no matter how sophisticated the projection technique or elaborate the data base, is open to question. Rather, state policymakers for higher education need the capacity to examine students' enrollment behavior on an ongoing basis. They must be able to rapidly identify changes in college-going rates and patterns, to explore their implications, to update and revise enrollment projections in the light of experience, and to identify the consequences on enrollment of policy decisions.

The lack of a capacity for analyzing students' enrollment behavior did not seriously hinder states during the 1950s and 1960s when enrollments grew at rapid rates and the problems of meeting tremendous increases in overall demands dominated other policy issues. Rapid growth provided "maneuverability" and a margin for error. Increases in the quantity of resources available to higher education provided opportunities to redress imbalances in the system or to undertake new efforts

without serious dislocation. New priorities were implemented, new departments, programs, campuses, and institutions developed, and new student needs met with these increased resources. Existing faculties and facilities did not have to be cut back to accommodate change.

Higher education is now emerging from that era and entering a period of much slower growth. State policymakers must turn away from problems of enlarging their educational systems and concern themselves with the "fine tuning" and refining of these systems. They can no longer assume that growth in enrollments will provide continued flexibility. Thus, policymakers now need a much deeper and more precise understanding of students' college-going and college-choosing decisions than sufficed in the past.

At the same time, the problems of predicting the number of students who will seek entry to a state's higher education system are complicated by recent departures from past trends in overall enrollment rates. A variety of hypotheses have been put forward to explain these departures: for example, the end of draft pressures, the changing demographic composition of high school graduates, more generalized acceptance of "stopping out" or temporary withdrawal from the educational system, and a decline in expectations as to the value of a college degree. But, at present, we do not know which, if any, of these explanations are valid. Nor do we know either the magnitudes of their respective impacts or their likely duration--which of these phenomena are transitory, and which are likely to be lasting.

The situation is further obscured by uncertainties regarding future economic conditions. Ebbs and flows in the overall state of the economy, the relative availability of jobs in different occupations, and the relative employment advantages of the college graduate affect students' perceptions of the value of higher education and, thus, influence their enrollment decisions. The particular economic circumstances of higher education are reflected in tuition levels and financial aid policies, which also influence students' college-going decisions. Yet trends in all of these factors are unclear.

Finally, students' enrollment rates and patterns are strongly influenced by present higher educational policies as well. The

accessibility and costs of higher education affect students' decisions as to whether they will go on to college and, if they do, where they will go.

At present, states lack the capacity to analyze students' enrollment behavior on an on-going basis. They have only limited resources available for research and policy analysis in higher education; and these tend to be consumed by day-to-day operational problems. Detailed analyses of students' enrollment rates and patterns are seldom undertaken; when they are they are viewed as "one-time" studies, often involving special data-collection efforts too expensive to maintain on a continuing basis. In any case, they are rarely updated in subsequent years.

This study is an initial step toward the development of such a capacity. The model we present below is based on data routinely available to Florida decisionmakers. It can be updated and revised annually. Similarly, the enrollment rates and patterns embodied in the model can be routinely re-analyzed to discover emerging trends and changes stemming from policy initiatives.

OVERVIEW OF THE ANALYSIS

None of the available data sources in Florida contained sufficient information to support an analysis of high school seniors' college-going rates and patterns. Thus, the first step in the analysis was to develop a data base by linking data elements from several different sources.* We then used the data base to estimate the rates at which students from each Florida high school went on to each of the state's public colleges and universities.

These rates can be expressed in terms of a transition matrix whose hi^{th} element is the probability that a student from high school h will go on to institution i. The institution index i ranges over Florida's community colleges and universities and a category termed "other," which includes in-state private colleges and universities, out-of-state institutions of higher education, and all noncollege activities.

*Data for 1971, the most recent available when the study began, were used.

The matrix serves many purposes of this study. By reconstructing it as more recent data become available, it would be possible to identify departures from past trends and the emergence of new trends in college-going rates and patterns. Short-term enrollment projections can be made using it, by multiplying the transition probabilities by the vectors of expected numbers of high school graduates in a given year. Finally, we use the matrix as the basic data source for a model that attempts to identify the factors influencing students' college-going decisions, and that has application to estimating the impact on enrollments of the opening of a new (or closing of an old) institution.

To accomplish the latter, we developed a series of estimation equations for the transition probabilities, as functions of the student characteristics in a high school and the characteristics of Florida's institutions. The particular configuration of Florida's higher education system led us to adopt a two-stage model: the first stage distributes a high school's graduates among major sectors of the higher education system; the second, among the institutions in these sectors. We used this model to project freshman enrollments by institution in the Fall of 1972. These projections were then compared to actual enrollments to help gauge the model's accuracy. Since Florida opened a new community college, Pasco-Hernando, in 1972, we were able to observe the model's performance when used to extrapolate beyond the environment in which it was constructed.

PLAN OF THE STUDY

The structure of this report is as follows. Section II provides an overview of Florida's system of higher education; it places in context many of the problems alluded to earlier. Section III summarizes the sources of data relevant to patterns and rates of enrollments, and comments on the problems contained in them. Section IV shows how these data were assembled and analyzed to obtain a high-school-to-college transition matrix; some discussion is also given on how this matrix might be used. An additional step that seemed important to us was to analyze this transition matrix, to determine what factors underlie variation in students' college-going rates; this is the subject of

Sec. V. Section VI consists of an application of this model to projecting enrollments by institution in 1972; these projections are compared to actual enrollments to test the accuracy of the model.

II. HIGHER EDUCATION IN FLORIDA*

In Florida, as in the rest of the nation, the postwar baby boom resulted in a concentrated wave of new enrollments to the entire educational system through the 1950s and early 1960s, producing dramatic growth rates as that group progressed upward through successive levels of the educational system. However, as the birth rate leveled off in the late 1950s and declined slowly through the 1960s, the subsequent enrollments to the school system also leveled off. This growth in Florida's higher education system peaked in 1965 and has declined since. Private institutions as a whole suffered absolute declines in enrollments from 1970 to 1972. The percentage growth in enrollments over the period 1958-1972 is shown in Table 1.

Table 1

RATE OF GROWTH IN ENROLLMENTS: 1958-1972
(In percent)

	Growth in Enrollments from Previous Year		
Year	Public Sector	Private Sector	Statewide
1958	17.8	4.0	11.5
1960	23.4	0.3	13.4
1962	16.9	3.3	12.2
1964	17.5	7.6	14.6
1966	14.6	3.4	13.5
1968	13.2	9.2	12.2
1970	8.4	2.1	7.1
1972	6.0	-3.6	4.3

At present, higher education in Florida is provided by 9 state universities, 28 public community colleges, and 25 private colleges and universities. The private sector includes 22 bachelor degree

*The data presented in this section are derived from *Enrollments in Florida Institutions of Higher Education: Fall 1972*, the Florida Board of Regents, Tallahassee, Florida, July 1973.

granting institutions (BDGIs) and 3 two-year colleges. The system served over a quarter of a million on-campus students in 1972. Table 2 shows the distribution of students by level and sector in that year.

Table 2

ENROLLMENTS IN FLORIDA INSTITUTIONS
OF HIGHER EDUCATION: FALL 1972

Sector	On-Campus Enrollment			
	Undergraduate Students			
	First Time in College	Previously Enrolled	Graduate Students	Total Students
State University System	9,344	64,808	14,561	88,713
Public Community Colleges	43,476	78,351	--	121,827
Private BDGIs	8,822	29,194	4,576	42,592
Private Junior Colleges	492	488	--	980
Total	62,134	172,841	19,137	254,112

The dominant role of public higher education in Florida is the result of a detailed plan for the development of the state's public system. The basic thrust of this policy was determined in 1955 by the Council for the Study of Higher Education in Florida, which recommended rapid expansion of the two-year college system for lower-division education and concomitant concentration of the university system in upper-division, graduate, and professional education. Of the 28 community colleges, 20 were created between 1958 and 1968, and one was opened in 1972. Only 3 of the 9 state universities pre-date 1960; 4 were added in the 1960-1968 period and the remaining 2 became operational in 1972. Of the 6 new universities, 4 have no lower-division programs at all.

Florida's program for the development of public higher education has had a decided impact on the distribution of enrollments among the state's higher education sectors. Overall, enrollments in Florida

colleges and universities have grown by more than 550 percent since 1958, although enrollments in the state's private institutions have not quite doubled over the same period. Table 3 presents total enrollments and the distributions of enrollment by sector for alternate years since 1958.

Table 3

PERCENTAGE DISTRIBUTION OF ENROLLMENTS
BY SECTOR: 1958-1972

Year	On-Campus Enrollment	Percent of Enrollments			
		State University System	Public Community Colleges	Private BDGIs	Private Junior Colleges
1958	56,352	41.3	15.6	39.8	3.3
1960	68,207	39.7	23.2	34.8	2.3
1962	87,920	37.4	31.6	28.9	2.1
1964	116,906	32.9	39.3	25.6	2.2
1966	155,944	31.0	45.5	21.5	2.0
1968	192,982	31.4	46.5	20.3	1.9
1970	226,726	32.4	47.6	18.1	1.9
1972	254,112	34.9	48.0	16.7	0.4

In response to the rapid expansion of the public sector, Florida's private institutions have increasingly relied upon out-of-state students to maintain their enrollments. Florida residents accounted for about 72 percent of total enrollments in private institutions in 1958. By 1972, 65 percent of the students enrolled in private colleges and universities were Florida residents. This contrasts to the trend for the state as a whole: The ratio of in-state students to total enrollments in public institutions of higher education grew from 0.82 to 0.86 during the same period. Table 4 shows the numbers of Florida resident students and their distribution by sector for alternate years since 1958.

Table 5 presents the numbers and distributions by sector of first-time-in-college (FTIC) Florida residents at two-year intervals since 1958. Viewed from the perspective of a Florida student making an

Table 4

PERCENTAGE DISTRIBUTION OF FLORIDA STUDENTS
BY SECTOR: 1958-1972[a]

Year	No. Florida Students	Percent of Florida Students			
		State University System	Public Community Colleges	Private BDGIs	Private Junior Colleges
1958	46,378	43.3	18.6	34.6	3.5
1960	56,339	41.5	27.4	28.8	2.3
1962	74,468	38.7	36.2	23.0	2.1
1964	101,124	32.8	44.1	20.9	2.2
1966	131,929	32.2	49.9	15.9	1.9
1968	164,228	32.8	51.2	14.3	1.7
1970	194,758	33.8	52.2	12.4	1.6
1972	217,485	36.3	52.7	10.9	0.1

[a]Percentages may not add to 100 because of rounding.

Table 5

PERCENTAGE DISTRIBUTION OF FTIC FLORIDA STUDENTS
BY SECTOR: 1958-1972

Year	No. Florida FTIC Students	Percent of Florida Students			
		State University System	Public Community Colleges	Private BDGIs	Private Junior Colleges
1958	13,852	33.9	32.7	28.2	5.2
1960	18,216	35.2	42.9	18.6	3.3
1962	21,643	24.9	57.0	14.3	3.8
1964	29,203	23.1	61.6	11.9	3.4
1966	37,518	16.4	69.4	11.4	2.8
1968	41,702	17.0	72.7	7.7	2.6
1970	47,729	19.5	70.8	7.3	2.4
1972	51,579	15.9	77.5	6.4	0.2

initial college choice, the tremendous increase in the role of the community colleges, the planned declining role of the state universities, and the precipitous drop in the role of the private sector are all apparent.

Two current facts imply that the rate of growth in enrollments will continue to decline: in absolute numbers, there are *fewer* children under five years of age today in Florida than there were ten years ago; and the public school enrollment for grades 1 through 8 is essentially the same (approximately 120,000) in each grade. Unless grade-to-grade retention ratios improve dramatically (particularly in the high school grades) or the pattern of Florida's net immigration in school-age groups undergoes substantial change (it is essentially zero now, since most immigrants are senior citizens), the conclusion is inescapable: the pool of Florida high school graduates will level off at about 90,000 (representing a 74 percent retention ratio on the constant base of about 120,000 now in grades 1 through 8) in 1975, it will remain essentially constant until 1980, and then it will experience a slight decline for several years. Thus, the immediate (1975-1985) outlook is reasonably clear: the tremendous college enrollment growth in the 1960s will slow down in the 1970s and will very probably *stop* in the 1980s.

III. DATA

Our initial thought was that if we were to develop anything of use to decisionmakers in higher education, it had to depend on data that were routinely available. In this section we describe the existing data sources in Florida, the variables available from each source, and the quality of the data. We then discuss the procedures we used to determine data elements needed for the analysis which could not be directly obtained from existing sources.

THE AVAILABLE DATA SOURCES

Characteristics of High School Seniors

Florida annually attempts to survey all high school seniors in the state. This survey, Plans Beyond High School (PBHS), obtains information on each student's age, race, sex, and family income. It also includes a series of questions on what students intend to do after high school: whether or not they plan to go on to college and, if so, whether to an in-state or out-of-state institution. Students who intend to continue their education in-state are asked the type (public or private, two-year or bachelor degree granting) and name of the institution they plan to attend. The student's social security number and high school are also indicated.

A few private high schools, all very small, do not participate, and a few seniors in participating institutions are "missed" each year. However, for practical purposes, the data obtained from this survey describe the characteristics of the state's entire high school senior class. The variables we obtain from this source are *race*, *sex*, and *family income*. Preliminary examination suggested that the variance in students' ages was so small that that variable would contribute little to the analysis.

The information on high school students' plans for the forthcoming year has been shown to be heavily biased. In the Fall of 1969, Stafford (1971) followed up a random sample of 1116 high school seniors who had

graduated in the previous spring. Two-thirds of the students sampled had expressed an intention of going on to college when they responded to the PBHS survey as high school seniors, but only 70 percent of those who intended to go on to college actually went; and 40 percent of those who intended to go on to college, and did, attended an institution of a different type from that indicated in their response to the survey. Of the seniors who did not express an intention to go on to college, 18 percent were found to be attending colleges or universities. Overall, only 43 percent of the students in Stafford's sample actually implemented the plans they expressed as seniors.

Ability of High School Seniors

Each year, high school seniors take the Florida Twelfth Grade Test (FTGT), a standardized achievement test. The test has five parts, but it is customary, in Florida, to express a student's score as the sum of his percentile rankings on each part. For example, admissions requirements at the State Universities (excepting Florida A&M) include a FTGT "score" of 300, meaning that a student's average ranking on the five parts of the test must be at the 60th percentile or better. A student's social security number and high school code are recorded with his test subscores.

Again, the state attempts to include all high school seniors in the testing program. We use the sum of the percentile rankings as a measure of students' *ability*.

Enrollments in Higher Education

The registrars of all Florida colleges and universities report their enrollments annually by level (FTIC, previously enrolled undergraduate, or graduate), sex, and county (Florida students) or state (out-of-state students) of residence. In the remainder of this report we refer to data from this source as Florida Enrollments (FE) data. These data provide the numbers of *Florida* (FTIC) *entrants* by institution and county.

Characteristics of Entering Undergraduates

Entering undergraduates* in Florida's public colleges and universities are surveyed annually. A small number (4 in 1971) of private institutions occasionally participate in the survey. The sampling rate varies among institutions; smaller two-year colleges tend to include all, or nearly all, entering undergraduates, although larger two-year colleges randomly sample only one-fourth to one-half of their entrants; the state universities tend to survey roughly two-thirds of their entering undergraduates. In 1971, for example, 63 percent of FTIC students entering state universities were included; the public community colleges surveyed 41 percent of their FTIC students that year.

The Entering Undergraduate Survey (EUS) collects information on students' demographic characteristics (age, race, sex, and family income), degree plans, and choices of major field or program. Respondents are asked if they entered directly from high school, transferred directly from another college or university, or spent some intervening period in the armed forces or working. The version of the questionnaire used by the public two-year colleges also obtains data on whether the student graduated from a Florida or an out-of-state high school and, in the former case, the name of the high school. A student's social security number and the code number of the college he attends are also recorded.

We use these data to construct two important variables for each college: the *ratio of immediate to deferred entrants* and the *numbers of students in the sample who entered directly from each Florida high school*. The former is defined, for each state university, as the proportion of all FTIC students who entered directly from high school. For each two-year college, we use the proportion of Florida FTIC students who entered directly from high school. In either case, a student who enters at the freshman level and who did not attend a college or university the previous year is assumed to be a FTIC student.

Since the two-year college questionnaire identifies the high school of students who entered the college directly from high school, we can

*The survey includes incoming transfer students at the undergraduate level as well as FTIC students.

tabulate the numbers of students sampled who directly entered each two-year college from each high school. To derive similar data for the public universities, the social security numbers on the PBHS for one academic year can be matched to those on the EUS for the subsequent academic year. Missing and invalid numbers are common in both sources and "matches" must be checked by comparing responses to birthdate, race, and sex. Nonetheless, our examination of these sources suggests that successful matches should be obtained for about 50 percent of the students in the university sample who entered directly from a Florida high school.

Numbers of High School Graduates

Each year the principals of Florida's high schools report the numbers of their respective graduating seniors. These High School Reports (HSRs) also indicate the principals' assumptions regarding the numbers of graduating seniors who will go on to each type of in-state institution (public or private, two-year or bachelor degree granting), to an out-of-state institution of any type, or to an activity other than higher education. The data on students' postsecondary activities, however, are generally viewed with skepticism in Florida. It is generally believed that principals, particularly in the larger high schools, simply do not know what happens to their graduates and probably do not even know what all their seniors plan to do. Furthermore, Stafford's work, discussed above, demonstrates the unreliability of information concerning high school seniors' plans.

Accordingly, we use only *the number of graduates* for each high school from this source.

ESTIMATING THE NUMBERS OF NONENROLLEES AT FLORIDA PUBLIC INSTITUTIONS

Despite the wealth of data contained in the sources described above, certain important data elements are not directly available--in particular, data on seniors who do not go on to public institutions in Florida.*

*Since the EUS is essentially a sample survey, it cannot be assumed that high school seniors not found in the EUS in the subsequent year did not go on to one of Florida's public institutions.

This category of students includes three distinct classes of individuals: those who go on to private institutions in Florida, those who go on to out-of-state colleges or universities, and those who do not go on to college at all.

We have noted that the estimates provided by the PBHS survey of high school seniors and the HSR survey of principals are not reliable. The FE data do indicate the numbers of FTIC students from each county enrolled at each private Florida institution. But we have neither information on the distribution of immediate versus deferred entrants among these FTIC students nor the data required to disaggregate enrollments by county to enrollments by high school. The latter data are important, since only three private institutions in Florida draw significant numbers of Florida FTIC students from beyond their immediate locale. One or two counties generally account for the large majority of Florida FTIC enrollments at each private institution. In essence, we have too few nontrivial data points for each private institution at the county level.

It might have been possible to obtain the required information from a survey of private institutions. However, the resources available for this study were not sufficient to support such an effort. Moreover, had we undertaken such a survey, the resulting model would have been dependent upon the data obtained from it and could be updated or re-estimated and used in the future only if the survey were continued. Florida's resources for research and policy analysis in higher education are already strained and could not maintain this additional burden.

The situation is even more difficult in regard to out-of-state enrollees and those who do not attend college. There is absolutely no information at any level of aggregation, other than that contained in PBHS and HSR, on the numbers of students who chose one of these alternatives.

Analysis of the distributions of Florida FTIC students among Florida institutions suggested that relatively few (about 6 percent in 1972) of Florida's high school seniors go on to private institutions in the state, and there is every indication that this percentage

will decline in the future. The 1968 study by the U.S. Office of Education, National Center for Educational Statistics, of interstate mobility, found 7080 Florida FTIC students in colleges outside Florida. Since these FTIC students include both those who went directly to college from high school and deferred entrants, it appears safe to assume that the proportion of Florida's high school graduates who immediately enter out-of-state institutions is well under 10 percent.* In a series of discussions with Florida decisionmakers in higher education, we were given estimates of the rate of immediate entry to out-of-state institutions that ranged from 3 percent to 5 percent.

In view of these crude results, we decided that attempts to estimate the numbers of students who entered each of the three tracks (private in-state, out-of-state, noncollege) were not justified. Instead, we concentrated on estimating the aggregate number of students from each high school who did not go on to a public college or university in Florida.

Our first attempt at estimating the number of "other" students (high school seniors who went on to some activity other than a public college or university in Florida) was to estimate the numbers of seniors who went on to each public institution from each high school. We then summed over colleges for each high school and subtracted the result from the number of graduates at the high school given by HSR. The results of the attempt were disappointing, which led us to try an alternative approach.

Our second attempt was based on Stafford's work (discussed above). Specifically, his results implicitly provide estimates of the proportions of high school seniors who, given their plans, engage in each alternative postsecondary activity, by race and sex. Accordingly, we computed (using the data from PBHS) the race by sex by plan† distribution

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*Nearly 70,000 students graduated from Florida high schools in 1968.

†The variable "plan" takes on seven values: planning to attend an in-state, public or private, two-year or bachelor degree granting institution, to go out of state, undecided, or not planning to go on to college.

of students for each Florida high school and multiplied the number of students in each race by sex by plan class by the proportion of students in that class who, in Stafford's survey, did not go on to a public college or university. The results were summed by race and sex for each high school to obtain estimates, by high school, of the *numbers of graduates who engaged in "other" postsecondary activities.*

LOCATION

We felt that the distance a student had to travel to a college or university would influence his decision to enroll at that institution. We used the latitude and longitude of each high school as a measure of the location of the students who attended that high school. Latitudes and longitudes of Florida's public institutions were also coded and *distance* is computed as the straight-line distance in miles between a high school and a college.

CHARACTERISTICS OF COLLEGE STUDENTS

As noted earlier, the EUS provides data on the demographic characteristics of entering undergraduates. To obtain estimates of the ability distributions of the students entering each of Florida's public institutions, the social security numbers of students included in the EUS in one academic year can be matched to those on the FTGT file* for the previous academic year. The result is a sample indicating the *ability of college entrants.*

SUMMARY OF DATA

Table 6 summarizes the available data. Data elements are listed in the stub column and each subsequent column reflects information from one of the data sources listed above. The symbols in the table indicate the quality of the available data according to the following scheme:

*The Planning and Analysis Division of the University of Florida did the match and provided us with a data set listing, for each student whose responses to EUS and FTGT could be matched, a college code, and the FTGT score (the sum of the student's five percentile rankings).

Table 6

AVAILABLE DATA

Element	Source					
	PBHS	FTGT	FE	EUS	HSR	Other
High school seniors:						
Sex	C					
Race	C					
Income	C					
Ability		C				
No. graduates					C	
No. seniors who go on to:						
Public 2-year	U		C[a]	S	U	
State university	U		C[a]	S	U	
Private in-state	U		C[a]		U	
Out-of-state	U				U	X
No. seniors who do not go on	U				U	
College entrants						
Immediate	U		C[a]	S	U	
Deferred				S		
High School	M			M		
Sex				S		
Race				S		
Income				S		
Ability	M			M		
Distance						X

[a]Data are certain, but include deferred as well as immediate entrants.

blank = data element not available from source;

C = certain, the source provides accurate data for the relevant population;

S = the source provides accurate data for a random sample of the relevant population;

U = unreliable data;

M = data obtained on a sample of the relevant population by merging indicated sources; and,

X = data constructed by us as described above.

IV. THE TRANSITION FROM HIGH SCHOOL TO COLLEGE

AVAILABLE DATA

At the time this study began, the most recent year for which the available data sources could be assembled was 1971. We decided to employ those data in the analysis. As more recent data became available they were reserved for tests of the predictive power of the results. Thus the numerical results reported below pertain to 1971. However, the data sources are routinely available annually and the procedure we use to estimate the transitions has been designed for use with the data from these sources. The entire process can thus be replicated on the data from any year.

PRELIMINARY CONSIDERATIONS

Once these data sources were assembled and understood, it was apparent that no single one of them was sufficient to describe the choices that graduating seniors had made. The EUS looked to be the most comprehensive and reliable; but since it was administered only at public institutions, it contained no information about graduating seniors who chose other sectors. The PBHS file, with the adjustment model described earlier, seemed to provide a way to identify those students who went on to a public institution and those who did not, but it lacked information about the size of each high school's graduating class. Fortunately, the HSR file could provide this. Another problem with the EUS file was that it was based on samples of sometimes very few students (some schools provided over a thousand usable observations, whereas others provided only fifty), so there was some question about its reliability. The FE provided countywide checks for each institution and would presumably be useful in calibrating estimates from the EUS file; still, the enrollments file by itself was thought not to be very useful because its level of aggregation--the county--was quite high. Thus, it was clear that all of these sources would have to be linked together in describing the choices students made.

Whereas previous approaches to modeling postsecondary choice have

dealt mostly with student-level data (i.e., a student's characteristics were observed, assumptions were made about the alternative choices open to him, and finally his choice was observed),* it was evident to us that our data limitations were forcing us to seek a higher level of aggregation. The next level up was the high school. According to the previous discussion, we thought it would be feasible to describe how students in a given high school divide themselves into sectors and, within certain sectors, among institutions; i.e., we would be able to estimate the probabilities of making certain kinds of choices. In addition, we felt that it would be possible to investigate factors influencing student choice by relating these probabilities to the characteristics of the students at different high schools, including the distance they must travel to get to a particular institution. Still another level of aggregation would have been the county, and at this level, the probabilities themselves would be based on firmer data (FE gives county-by-institution breakdowns). But we felt that that level of aggregation would destroy potentially meaningful information about factors influencing choice: counties are considerably more homogeneous than high schools, the distances between residents of the county and various institutions are poorly defined, and finally there are only 67 counties, which does not provide many degrees of freedom. Thus, we chose to study the data at the high school level.

NOTATION

Before proceeding, it will be necessary to establish a considerable amount of notation. The definitions below will be referenced heavily in the remainder of this section.

First, the matrix to be estimated is

(Definition A) N_{hi} = the number of graduating seniors from high school h who enrolled in institution i.

*See Kohn, Manski, and Mundel (1974), for example.

The index h ranges over 376 Florida high schools; the list is shown in Appendix A. The index i ranges over state universities and junior colleges that admit freshmen* (32 institutions), plus an "others" category, which captures the rest. Note that the "others" category includes out-of-state college-goers as well as those who do not go on to college. We were forced to mix such dissimilar groups by data limitations.

Next, let

(Definition B) n_{hi} = number of freshmen entering institution i observed to be from high school h.

This is the random sample of entering freshmen at each of the 32 institutions.

The first constraint on the N_{hi}'s imposed by outside sources is

(Definition C) $N_{h.}$ = number of graduating seniors from high school h.

These numbers were available from the HSR file. Note that the $N_{h.}$'s relate back to the N_{hi}'s in Definition A as follows:

$$N_{h.} = \sum_{i=1}^{33} N_{hi}$$

As mentioned, many of our data sources were aggregated at the county level. Thus, it is necessary to establish parallel notation for them. First, a function is needed that identifies the county to which a given high school belongs:

(Definition D) c(h) = county containing high school h.

There are 67 counties in Florida; they will be indexed by k. Within each county, let

*This list is given in Appendix B.

(Definition E) N^*_{ki} = number of graduating seniors in institution i from county k.

According to Definitions A and D,

$$N^*_{ki} = \sum_{c(h)=k} N_{hi}$$

Finally, let

(Definition F) n^*_{ki} = number of graduating seniors in institution i observed to be from county k.

Note that

$$n^*_{ki} = \sum_{c(h)=k} n_{hi}$$

The data in Definition E are not given, but they can be estimated fairly precisely from FE data. To see this, recall that the FE file provides first-time enrollments by county and institution but does not categorize them into the immediate or deferred category. The EUS file does, however; using it we were able to split the FE figure within each (k,i) category according to the observed immediate/deferred ratio.

ESTIMATING THE N_{hi} MATRIX

The initial attempt at estimating the N_{hi} matrix was as follows. For i = 1, ..., 32 (i.e., each institution), we estimated N_{hi} as

(Definition G) $\hat{N}_{hi} = n_{hi} \times \frac{N^*_{c(h)i}}{n^*_{c(h)i}}$ (sources: Definitions B, E, F)

That is, for each institution and high school, we counted the number of students in the EUS sample and rescaled them so that their county totals agreed with the estimates obtained from the FE source:

$$\sum_{c(h)=k} \hat{N}_{hi} = N^{*}_{ki}$$

This left only one category unfilled, the "others" category, which we took as

$$\hat{N}_{h33} = N_{h.} - \sum_{c=1}^{32} \hat{N}_{hi}$$

The corresponding table of estimated "others" had severe problems: many of the estimates were negative, others were disturbingly small. This can be traced to the fact that because of the small number of samples taken at many institutions, many of the N_{hi}'s were estimated imprecisely. It would seem also that for different institutions the $\hat{N}_{hi}$'s should not be generated independently of one another, because doing so would not take into account such vital information as the known number of students in each high school.

Thus, we sought a procedure that would rid us of the negative numbers and would allow us to use school totals information directly in estimating the N_{hi}'s. The first step, we felt, was to quantify what was known about "others"; negative and drastically small values were bad because they conflicted with prior knowledge, but it was necessary to state this formally so that it might be incorporated into an estimation technique. To be consistent with how the other n_{hi}'s were generated, we chose to pretend that this prior information came in the form of a random sample of "others"; i.e., within each county a number of persons from the "others" category was drawn and the number attending each high school observed. The proportional division among high schools could be determined according to the population estimates derived from the PBHS file, coupled with the adjustment based on Stafford's thesis (referenced earlier). It remained to specify how strong our prior information was. To do this, it was necessary to equate the degree of faith we had in our estimates to the number of "others" in each county that might have been drawn (called the equivalent sample size). We tried a variety of equivalent sample sizes, in each case

employing the estimating procedure below to produce a matrix of transition counts, which we then examined. At one extreme, we assumed very little prior information: i.e., an equivalent sample size of 1. This was an intuitively appealing choice, since the estimated counts become solely functions of the observed data. However, it did nothing to correct the negative counts problem; the "others" row is assumed to be so imprecisely measured that the estimation procedure adjusted the numbers in that row exclusively, obtaining what we had calculated before. At the other extreme, we considered the consequences of assuming maximal prior information; i.e., that the probability of being an "other" was exactly equal to our initial estimates, and thus that our problem was in reality only to estimate the N_{hi} for the non-"others" categories. However, we felt that this was too stringent a criterion. While it would lead to numbers with reasonable expected values, it conflicted with the idea that the N_{hi}'s ought not to be estimated separately. Thus, we tried equivalent sample sizes ranging from one-fourth to all of the number of "others" in each county. We observed that the estimated N_{hi}'s were positive throughout and that they remained fairly stable over this range.

Our final decision was to assume an equivalent sample size equal to the entire "others" category. In other words, we assume that all persons entering the "others" category from a given high school are observed. It can be argued, however, that this assumption is not overly stringent. For example, we observe that the mean numbers of students and "others" in high schools for which we have data are 130 and 40, respectively. For a high school with these numbers our equivalent sample would lead to a 95 percent confidence interval on the true probability of "others" being

$$\frac{40}{130} \pm 1.96 \sqrt{\frac{40}{130}\frac{90}{130}/130} = 0.31 \pm 0.08$$

$$= 0.31(1 \pm 0.25)$$

Thus, the chosen equivalent sample size still is consistent with an inference on the true probability of "others" being 25 percent away

from the estimated proportion, and it is reasonable to expect that with the PBHS responses and Stafford's correction, our prediction of that probability in each high school would at least be that close.

Thus, we assume that the size of the "others" sample is

$$N^*_{k33} = \sum_{c(h)=k} N_{h.} - \sum_{i=1}^{32} N^*_{ki} \quad \text{(sources: Definitions C, D, E)}$$

a function of quantities which are known, and we assume that the observed counts of "others" by high school, n_{h33}, satisfy

$$\sum_{c(h)=k} n_{h33} = N^*_{k33}$$

and are proportional to estimates of the number of others obtained from the PBHS file using Stafford's empirical correction probabilities.

THE ESTIMATION PROCEDURE

The estimating procedure chosen is a variant of the method proposed by Deming and Stefan (1940). The objective is to minimize the chi-squared distance between estimates and data, subject to the indicated constraints. Formally, this would entail looking within each county and choosing the N_{hi} to minimize the sum of squared differences between the observed and expected counts normalized by the expected counts: i.e., minimize

$$\sum_{c(h)=k} \sum_{i=1}^{33} \frac{(E_{hi} - O_{hi})^2}{E_{hi}} = \sum_{c(h)=k} \sum_{i=1}^{33} \frac{\left(N_{hi} \frac{n^*_{ki}}{N^*_{ki}} - n_{hi} \right)^2}{N_{hi} \frac{n^*_{ki}}{N^*_{ki}}}$$

$$= \sum_{c(h)=k} \sum_{i=1}^{33} \frac{n^*_{ki}}{N^*_{ki}} \frac{(N_{hi} - \hat{N}_{hi})^2}{N_{hi}} ,$$

where $\hat{N}_{hi}$ is as shown in Definition G. But, in fact, the algebra becomes vastly simpler if the the denominator is taken to be $\hat{N}_{hi}$, instead of N_{hi}, for as Deming and Stefan show, the expression can then be minimized in N_{hi} through the use of LaGrange multipliers. The problem formally reduces to the solution of simultaneous linear equations, where the number of equations is one less than the minimum number of categories over which either index is summed.

Additional insight into the characteristics of the estimates can be obtained by observing that, formally, the procedure is equivalent to solving the constraint equations with estimates of the form

$$\text{(Definition H)} \quad \hat{N}'_{hi} = \hat{N}_{hi}\left(1 + a_h \frac{N^*_{c(h)i}}{n^*_{c(h)i}} + b_i\right).$$

That is, the ordinary estimates $\hat{N}_{hi}$ are rescaled row- and columnwise to sum to the targeted constraints. Within a given high school, the amount of rescaling done is dependent upon the sampling rate for its county at the particular institution: if it was sampled lightly, a lot of rescaling is done, since the inverse of the sampling rate $n^*_{c(h)i}/N^*_{c(h)i}$ is large. On the other hand, heavy sampling results in less of a modification.

The procedure was applied to data from each of 67 counties and 33 institutional classifications. The results are the complete high-school-to-college transition matrix, shown in Appendix C. Of necessity, all of the row and column constraints imposed by external data sources are satisfied. It might also be noted that all of the estimated counts are nonnegative, a necessary condition for the estimates to be useful.

USING THE TRANSITION MATRIX TO PROJECT FRESHMAN ENROLLMENTS

The transition matrix provides a basis for projecting freshman enrollments by institution. Divide the entry in each cell, $\hat{N}'_{hi}$, by the number of students, $N_{h.}$, at the high school. This yields $\hat{p}_{hi}$, the empirical frequency that a student from high school h enrolls at college

or university i. Now let $M_{h.}$ be the total number of students in a future year's graduating class at high school h.* If the distribution of students from each high school is the same as before, then the projected enrollment from high school h to institution i is

$$M_{hi} = \hat{p}_{hi} M_{h.} ;$$

summing over the high schools in each county k we obtain M^{*}_{ki}, projected enrollment from county k to institution i. Finally, assuming that the ratio of deferred to immediate FTIC entrants from county k to institution i is constant, the M^{*}_{ki} are each scaled upward by α_{ki}, the ratio of total Florida FTIC enrollments to immediate Florida FTIC enrollments from county k to institution i that prevailed in 1971. Total Florida freshmen enrollment at college i ($F_{.i}$) is then projected to be

$$F_{.i} = \sum_{k} M^{*}_{ki} \alpha_{ki} .$$

The procedure used to estimate the transition matrix can be repeated annually, thereby developing updated estimates of the high-school-to-college transition probabilities, the $\hat{p}_{hi}$, based on the previous year's experience. Intuitively, this would provide improved estimates in the sense that the recent past is likely to be a better guide to the future than is the more distant past.

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*In a parallel study, the Planning and Analysis Division at the University of Florida has developed a transition matrix for Florida's elementary and secondary education system, which can be used to project future graduating classes at Florida's high schools.

V. FACTORS INFLUENCING ENROLLMENT RATES

The transition matrix describes students' college-going and college-choosing decisions, but it offers no insight into the factors that influence their decisions. In this section we analyze the $\hat{p}_{hi}$'s to discover the factors that underlie high-school-to-college transitions. We begin by reviewing the traditional approach to the problem and point out why it cannot be employed in Florida, given the data now available. We then describe the approach we took, the methodological details, and our results. The discussion of methodology may be skipped without breaking the continuity of the section.

THE TRADITIONAL APPROACH

Previous studies of college-going rates and patterns have generally assumed that students make rational decisions in the cost-benefit sense.* A student is confronted with a choice among alternative post-secondary options, each of which offers certain benefits and costs. Given the information at his command, he presumably pursues that option whose costs and benefits are such that its perceived "rate of return" is greater than that offered by any alternative option. Costs and benefits are not limited to purely economic factors; for example, the current and future consumption benefits of education may be included.

Since few of the costs and benefits offered by any particular post-secondary option are susceptible to measurement, the previous studies generally employ some variant of the following model. A student evaluates an institution of higher education on the basis of its attributes--tuition, distance, academic quality, expenditures per student, percent of faculty having Ph.D.s, proportion of students who reside on

*Kohn, Manski, and Mundel (1974) is the most ambitious effort to date. Christensen, Melder, and Weisbrod (1975), Anderson, Bowman, and Tinto (1972), Bishop (1972), Barnes et al. (1972), Corazzini, Dugan, and Grabowski (1972), Miller (1971), Hoenack (1971), and Radner and Miller (1971) are other recent examples.

campus, and so on. These attributes may be valued in themselves, or they may be proxies for unobservable costs or benefits. The student also has a minimum rating (interpreted as the upper bound of his evaluations of his non-higher-educational options), such that he will not enroll at a college or university with a lower rating. He enrolls at the highest rated institution if two or more have ratings in excess of the minimum. A student's preferences for various institutional attributes and/or his minimum acceptable rating may be functions of his characteristics; e.g., high ability students may place greater weight on academic quality and, other things being equal, are more likely to go on to college than are low ability students.*

This model can be explicitly formulated using the techniques developed in the economic theory of consumers' behavior. In brief, it implies that both the probability of a student going on to college and the conditional probability of his enrolling at a particular institution are functions of the institution's attributes, the attributes of the other institutions available to him, and his personal characteristics.

Despite the intuitive appeal of this approach, preliminary analysis convinced us that it was not a useful framework for an investigation of students' enrollment behavior in Florida. With the exception of Florida A&M, which differs from the others in every respect, the state universities are remarkably homogeneous in terms of their observable attributes. Their respective distances from a student and their sizes do differ. But they charge the same tuition and fees, offer the same financial aid programs, have the same admissions criteria, rank about the same on conventional measures of academic quality, and so on. The community colleges are also quite similar to one another. Distances and sizes again differ. However, differences among community colleges along other observable dimensions are small. Moreover, preliminary

*Some studies also attempt to deal with the relationships between a student's characteristics and the set of institutions available to him; an institution's admissions criteria or an inability to defray the costs of going there may make it inaccessible to a low ability or low income student. See Kohn, Manski, and Mundel (1974), for example.

analysis revealed that the large majority of students who went on to a community college went to the nearest one; and most of the students who went to a community college other than the nearest one attended an institution not much further away.*

These observations indicated that students' choices among state universities other than Florida A&M could not be explained by differences in their respective attributes, with the possible exception of their distance and size. Similarly, it was clear that even if students chose among community colleges on the basis of their respective attributes, these choices were completely dominated by relative distances. Finally, a comparison of any community college and any state university other than Florida A&M yielded differences along every attribute dimension; however, these differences were substantially the same regardless of which community college was compared to which state university. There are large differences among the private institutions and between any private institution and either type of public institution. But so few students enrolled in private institutions that little can be learned from analyses of these differences. In sum, the particular pattern of enrollments in Florida permits us to observe that some students prefer the combination of attributes offered by the state universities; others prefer the combination of attributes offered by the community colleges; a few students find that Florida A&M offers the most attractive combination of attributes; and the remainder prefer various unknown alternatives to the combinations of attributes offered by the public colleges and universities. We cannot sort out the separate impacts of specific attributes included in each combination of attributes.

These observations imply that the traditional approach to the analyses would be fruitless. At the same time, they suggest an alternative approach. In essence, we find Florida's students grouping themselves into four broad classes. Assuming that their decisions are not purely random, there must be differences between the students in one

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*Our measure, the straight-line distance between a student's high school and a college or university, takes no account of Florida's road or public transportation systems. The college nearest to a student, by our measure, may not be most accessible, particularly if his high school is roughly equidistant from two or more community colleges.

group and those in another in terms of their preferences. For example, students who go on to state universities must differ in their evaluation of an institution from students who go on to community colleges. Since preferences may systematically vary with their characteristics, this raises the possibility that their college-going and college-choosing decisions could be modeled in terms of their characteristics.

AN ALTERNATIVE APPROACH

Suppose we had a vector of characteristics $z = (z_1, z_2, \ldots, z_p)$ for every Florida high school graduate in this year's graduating class, and we wanted to predict each student's choice of postsecondary alternatives based on his characteristics. For our purposes, there are K(=33) alternatives of interest: which public institution to attend, or whether to enter the "others" category.

From a purely statistical viewpoint, our problem can be viewed as one of classifying each high school graduate into one of K mutually exclusive and exhaustive populations $\pi_1, \pi_2, \ldots, \pi_K$ based upon his vector of characteristics. Let us assume for the moment that we have prior estimates of the graduates that will enter each of the populations π_i, and let these proportions be denoted by $p_1, p_2, \ldots, p_K$. Here, as elsewhere, we think of these p_i's as being proportional to the number of students who entered the population in the previous year. Let us also assume that we know the density or probability function $f_i(z)$ of the characteristics z within each population π_i. Then the statistical procedure for minimizing the probability of misclassification for each individual assigns the individual characteristics z to π_i if the conditional (posterior) probability $p(i|z)$ that the individual belongs to π_i, given his characteristics z, exceeds that for the other subpopulations. Bayes' theorem yields the formula

$$p(i|z) = p_i f_i(z) / \sum_{i=i}^{K} p_i f_i(z) \quad . \qquad (1)$$

It is instructive to see where this exercise would lead if the vectors of characteristics z of individuals in π_i can be assumed to have a multivariate normal distribution $N(\mu_i, \Sigma_i)$. In this case

$$f_i(z) = c_i e^{-D_i^2(z)/2} \tag{2}$$

where $c_i = (2\pi)^{-p/2}|\Sigma_i|^{-1/2}$ and $D_i^2(z) = (z - \mu_i)'\Sigma_i^{-1}(z - \mu_i)$. The quantity $D_i(z)$ is called the "Mahalanobis distance" between z and the mean vector μ_i. It provides a generalized distance between the high school graduate's characteristics (ability, income, race, sex, coordinates of his home) and those of the individuals in π_i. If the proportions p_i and the covariance matrices Σ_i were the same for all π_i, the classification scheme outlined above would assign each individual to the population that was closest to him in the sense of Mahalanobis distance.

To use the above scheme to obtain enrollment projections for students in a given high school, one can in theory compute the conditional probabilities $p(i|z)$ for every graduate and institution and then average these probabilities over all graduates (i.e., over all vectors z) to obtain the expected proportion of graduates that will enter population π_i. The resulting numbers would then be analogous to the $\hat{p}_{hi}$'s and could be used as enrollment projections for each of the strata π_i.

The homogeneities alluded to earlier within groups of universities and junior colleges suggested the possibility of constructing a two-stage model. The first stage would consist of a choice among basic institutional "tracks." There would be four tracks to choose among:

(U) Universities (other than Florida A&M);
(F) Florida A&M;
(J) Junior colleges;
(O) Others (those who do not go on to college, those who go out-of-state).

A second-stage choice would consist of picking a specific institution within a given track.

METHODOLOGICAL DETAILS

We begin by noticing that the probabilities of the four tracks sum to one, and thus it would be sufficient to estimate the probabilities of three. We felt that the best approach was to develop separate models for

$$\log [P_h(U)/P_h(J)] = \log R_h(U),$$

$$\log [P_h(F)/P_h(J)] = \log R_h(F),$$

$$\log [P_h(O)/P_h(J)] = \log R_h(O).$$

The reasons are part theoretical, part empirical, as explained in the subsequent sections. But these models also produce a set of nonnegative probabilities which necessarily sum to one. For, given estimates of each such quantity, the result

$$\hat{P}_h(J) = \frac{1}{1 + \hat{R}_h(U) + \hat{R}_h(F) + \hat{R}_h(O)} > 0 ,$$

$$\hat{P}_h(U) = \hat{R}_h(U)\ \hat{P}_h(J) > 0 ,$$

$$\hat{P}_h(F) = \hat{R}_h(F)\ \hat{P}_h(J) > 0 ,$$

$$\hat{P}_h(O) = \hat{R}_h(O)\ \hat{P}_h(J) > 0 ,$$

$$\hat{P}(J) + \hat{P}(U) + \hat{P}(F) + \hat{P}(O) = 1$$

readily follows.

Our Bayesian approach suggests that the means and covariances of student characteristics at each institution ought to be principal explainers of the $\hat{p}_{hi}$'s; moreover, the variables likely to be useful in explaining differences in the $\hat{p}_{hi}$'s are those whose means and covariances differ from one institution to the next, whereas variables that show little variation across institutions are probably unimportant. Thus, we used the sample of entering undergraduates at each institution,

computed the means, standard deviations, and correlations of our student-level variables (ability, income, sex, race, distance to institution, distance to nearest junior college, distance to nearest university, high school coordinates, etc.), and looked at them to make the above classifications. The tables of numbers are omitted from this presentation because there were so many of them. Our interpretation of them, however, is as follows:

(1) Percentage female was reasonably constant among institutions, nearly always between 40 and 60 percent; thus, we expected that it would not be a useful predictor variable.

(2) Percentage black was higher for junior colleges than universities and generally small except for Florida A&M, where it exceeded 97 percent. Thus, it might be useful in explaining high versus low enrollment rates at that particular institution, and useful perhaps in predicting university versus junior college choice, but not very useful in selecting among individual institutions.

(3) Ability and log income tended to be normally distributed. Mean ability and mean log income were often the same within junior colleges and universities (except for Florida A&M) but different between the two groups. Thus, they might be useful in distinguishing between types of institution but not in selecting among the individual members. Another interesting point was that their variances and covariances were similar for all institutions.

(4) Distance between high school and institution tended to be quite small for junior colleges and independent of other variables; for universities, the distance tended to be larger, but again, independent of other variables. Moreover, those who had chosen a junior college typically had chosen the nearest junior college, and had rarely gone beyond the second nearest junior college, while university-goers generally had attended high schools at greater distances from the nearest junior college. Thus, it seemed that distance would be an extremely important predictor variable, both in terms of the type of institution selected and the specific one chosen.

Based upon these observations of differences and similarities in means and covariances, it seemed reasonable to try using all variables

to model the choice between tracks but to limit the variables explaining choice within track to distance and size.

The University Model

Our initial model for the probability of choosing a university, given that a university or a junior college is chosen, is

$$P_h(U|U \text{ or } J) = \frac{1}{1 + \exp - (\beta_0 + \beta_1 A + \beta_2 I + \beta_3 \Delta_j^2 + \beta_4 \log S_j + \beta_5 \Delta_u^2 + \beta_6 \log S_u)} \quad (3)$$

where A = the mean ability measure among the graduating students at h;

I = the mean log income among these students;

j = the index of the nearest junior college to high school h;

Δ_j^2 = the squared distance from h to the nearest junior college;

S_j = first-time enrollment at that junior college in the previous year;

u = the index of the nearest university (other than Florida A&M) to high school h;

Δ_u^2 = the squared distance from h to the nearest university;

S_u = first-time enrollment at that university in the previous year.

We arrived at this point by expanding on our student-level decision model and making several simplifying assumptions, as described below.

According to the model based on student-level data, the probability that a student with characteristics z chooses a university, given that he chooses a university or junior college, is

$$P_z(U|U \text{ or } J) = \frac{\sum_U p_i f_i(z)}{\sum_U p_i f_i(z) + \sum_J p_i f_i(z)}$$

where the indices contained in the summation over U correspond to universities, and those contained in the summation over J correspond to

junior colleges. One can divide the numerator and denominator by the numerator to get

$$P_z(U|U \text{ or } J) = \frac{1}{1 + \sum_J p_i f_i(z) / \sum_U p_i f_i(z)} . \qquad (4)$$

As before, we assume that the density of characteristics z within each institution i is

$$f_i(z) = c_i e^{-D_i^2(z)/2}$$

where $c_i = (2\pi)^{-p/2} |\Sigma_i|^{-1/2}$ and $D_i^2(z) = (z - \mu_i)' \Sigma_i^{-1} (z - \mu_i)$. Here, the components of z for which we have data are:

z_1 = the student's ability measure;
z_2 = the student's log income;
z_3 = x-coordinate (longitude) of the student's high school;
z_4 = y-coordinate (latitude) of the student's high school.

An examination of the sample covariance matrices $\hat{\Sigma}_i$ indicated that the (x,y)-coordinates of the high schools are, for all practical purposes, uncorrelated with the other components of z at each of the institutions. This assumption, applied to the normal model above, is tantamount to assuming that the coordinates (x,y) are independent of the other coordinates. It implies that

(a) the covariance matrices Σ_i are of the form

$$\Sigma_i = \left[\begin{array}{c|c} U_i & 0 \\ \hline 0 & V_i \end{array}\right]$$

where V_i is the 2×2 covariance matrix of the coordinates (x,y) at the i^{th} institution, and

(b) the quadratic form $D_i^2(z)$ can be decomposed into

$$D_i^2(z) = Q_i(z) + R_i(x,y)$$

where Q_i and R_i are again the squares of generalized distances relative to the first two and last two coordinates of z and involve using the submatrices U_i and V_i in lieu of the full matrix Σ_i.

A further simplification of the model is afforded by the observation that the means of the characteristics z_1 and z_2 are, as a first approximation, constant within junior colleges and universities (although different between groups). This implies that the part of $D_i^2(z)$ that does not depend on the location of the student's high school, namely $Q_i(z)$, varies little across institutions of a given type, and that the subscript i can be replaced by a track index:

$$D_i^2(z) = Q_{T(i)}(z) + R_i(x,y) \ ,$$

where T(i) = U for universities, J for junior colleges. We shall use two further approximations: (1) the generalized variances $|\Sigma_i|$ are approximately the same within a track, implying that the constant c_i in $f_i(z)$ is a function of T(i); (2) the generalized squared distance $R_i(x,y)$ is some multiple (dependent upon track) of the actual squared distance $\delta_i^2 = \delta_i^2(x,y)$ between the high school graduates at (x,y) and the i^{th} college campus, i.e.,

$$R_i(x,y) = \gamma_{T(i)}\delta_i^2 \ .$$

Under the assumptions above, the density $f_i(z)$ can be written as

$$f_i(z) = c_{T(i)} \exp - [\gamma_{T(i)}\delta_i^2 + Q_{T(i)}(z)]/2 \qquad (5)$$

and hence,

$$\frac{\sum_J p_i f_i(z)}{\sum_U p_i f_i(z)} = \frac{c_J \exp [- Q_J(z)/2] \sum_J p_i \exp [- \gamma_J \delta_i^2/2]}{c_U \exp [- Q_U(z)/2] \sum_U p_i \exp [- \gamma_U \delta_i^2/2]} \qquad (6)$$

Now, from the observation that the covariance matrices of z_1 and z_2 are approximately the same between junior colleges and universities, it follows that $Q_J(z) - Q_U(z)$ is approximately a linear function of z_1 and z_2. Also, the dominant term in the summations corresponds to the nearest junior college or university. Thus,

$$\sum_J p_i \exp(-\gamma_J \delta_i^2/2) \doteq p_j e^{-\gamma_J \Delta_j^2/2} = e^{-\gamma_J \Delta_j^2/2 + \beta_J \log S_j} \tag{7}$$

$$\sum_U p_i \exp(-\gamma_U \delta_i^2/2) \doteq p_u e^{-\gamma_U \Delta_u^2/2} = e^{-\gamma_U \Delta_u^2/2 + \beta_U \log S_u} \tag{8}$$

where, as before, j and u index the closest junior college and university.

Substituting this back into Eq. (4) gives

$$P_z(U|U \text{ or } J) = \frac{1}{1 + \exp -(\beta_0 + \beta_1 z_1 + \beta_2 z_2 + \beta_3 \Delta_j^2 + \beta_4 \log S_j + \beta_5 \Delta_u^2 + \beta_6 \log S_u)} .$$

The derivation of Eq. (3) is completed by observing that the function $1/[+ \exp(- t)]$ is almost perfectly linear for values of t such that the function has values between 0.05 and 0.95, which occurs most of the time in the present situation. Thus, the average value of $P_z(U|U \text{ or } J)$ for students at high school h who chose either J or U is approximately $1/[1 + \exp(-\bar{t})]$, where $\bar{t}$ is the average value of the t's for that subset of graduates. We do not know either the average ability or average log income of that specific group, but it is reasonable to assume that they are highly correlated with the average ability and log income of all students in the high school. Thus, we approximate $\bar{t}$ by

$$\bar{t} = \beta_0 + \beta_1 A + \beta_2 I + \beta_3 \Delta_j^2 + \beta_4 \log S_j + \beta_5 \Delta_u^2 + \beta_6 \log S_u ,$$

and it follows that an approximation for $P_h(U|U \text{ or } J)$ is Eq. (3).

The Florida A&M Model

Our initial model for the probability of choosing Florida A&M, given that Florida A&M or a junior college is chosen, is

$$P_h(F|F \text{ or } J) = \frac{1}{1 + \exp - (\beta_0 + \beta_1 A + \beta_2 I + \beta_3 \Delta_j^2 + \beta_4 \log S_j + \beta_5 \Delta_F^2 + \beta_6 B)}$$

where A = the mean ability measure among graduates from high school h;
I = the mean log income among these students;
j = the index of the nearest junior college to high school h;
Δ_j^2 = the squared distance from h to the nearest junior college;
S_j = the first-time enrollment at that college in the previous year;
Δ_F^2 = the squared distance from h to Florida Agricultural and Mechanical University;
B = proportion black of high school h graduates.

A derivation for this formula exists which is analogous to the university model derivation up to Eq. (8). Here, however, it must be assumed that the prior probability of choosing Florida A&M depends on a student's race, and, thus, that the exponent ought to be of the form

$$- \gamma_F \Delta_F^2/2 + \beta_F\{\text{Race=black}\}$$

where {Race=black} denotes an indicator function which is 1 if the expression is true, 0 otherwise. Thus, when the averaging of $P_z(F|F \text{ or } J)$ is done, the formula for $\bar{t}$ includes an unknown constant times the fraction of blacks.

The "Other" Model

Our starting point for estimating the probability of being an "other," given a student chooses "other" or junior college, is based upon considerations similar to the university model:

$$P_h(0|0 \text{ or } J) = \frac{1}{1 + \exp - (\beta_0 + \beta_1 A + \beta_2 I + \beta_3 \Delta_j^2 + \beta_4 \log S_j)}$$

where A = the mean ability measure among graduates from high school h;
I = the mean log income among these students;
Δ_j^2 = the squared distance from h to the nearest junior college;
S_j = the first-time enrollment at that college in the previous year.

The one difference is that distance does not enter into the counterpart of Eq. (8), since we had no further information to indicate where a member of this group might go.

Choosing Among Junior Colleges and Universities

Only the model for choosing among junior colleges will be described--the one for universities is similar.

We begin by observing that the proportion of the graduates from high school h who will enter junior college i can be computed from

$$P_h(i) = P_h(J)\, P_h(i|J)$$

where $P_h(i|J)$ denotes the proportion of the junior college entrants from high school h who enter junior college i. According to Eq. (5), the density $f_i(z)$ of characteristics z among students at junior college i is approximately given by

$$f_i(z) = c_J \exp - [\gamma_J \delta_i^2 + Q_J(z)]/2 ,$$

where δ_i is the distance from the student with characteristics z to the junior college i and Q(z) is the quadratic form depending on the student's ability and family income. Since the conditional probability of attending college i among junior college entrants is

$$p(i|J,z) = \frac{p_i f_i(z)}{\sum_J p_k f_k(z)} ,$$

substituting for formula $f_i(z)$ above yields the result that $p(i|J,z)$ is proportional to

$$p_i e^{-\gamma_J \delta_i^2} = e^{-\gamma_J \delta_i^2 + \beta_J \log S_i}.$$

Since the distances δ_i are also the same for students in a given high school, it follows that $p(i|J,h)$ is also proportional to this expression. A simple method for estimating γ_J and β_J is to compare the number of junior college entrants who chose the nearest junior college with the number who entered the next nearest.

In applying this model to the choice among junior colleges, we note that Florida students almost never selected beyond the nearest two. Thus, for junior colleges only, we estimate the probabilities of third nearest, fourth nearest, etc., to be zero.

RESULTS

These models were fit to the high school transition data. The estimation procedure employed was the method of logistic regression,* which involves performing a weighted regression of $\log (\hat{N}'_{hU}/\hat{N}'_{hJ})$ on the above independent variables, with weight $\hat{N}'_{hU}\hat{N}'_{hJ}/(\hat{N}'_{hU} + \hat{N}'_{hJ})$. Cases in which $\hat{N}'_{hU}$, $\hat{N}'_{hJ}$, or both are zero pose no formal difficulty, since their weight is then also zero.

An alternative statistical method, multivariate logistic regression, was considered. However, we felt that available computational algorithms leave much to be desired and their results are difficult to interpret. Policymakers in higher education, with limited analytic resources at their command, are likely to encounter problems in using this technique. Instead we chose the above approach which employs well-known linear regression techniques and presents results (t-statistics, R^2, F-statistics, etc.) in a familiar form.

During our early attempts at fitting, we tried several variants of the above models, some using transformations of the given set of independent variables, others which took characteristics of the

*See Cox (1966) for a discussion of logistic regression.

institutions into account (e.g., mean ability and income of students, distances and sizes of the second-nearest institution of a given type), still others based on newly introduced high school variables (percentage female, mean log income of blacks, etc.). While we noticed at times a moderate improvement in R^2, this was generally at the expense of our being able to interpret the signs of the regression coefficients. The one glaring exception occurred when the logarithm of distance, rather than distance squared, was used in the formulas, in which case the fits improved dramatically. Thus, we decided to let the logarithm of distance replace distance squared wherever it appeared. But otherwise, we chose to leave things consistent with the theoretical derivation. The results are shown in Tables 7-11.

For the university model (Table 7), the probability of entering a university rather than a junior college is high for high ability high school students who are near to a university and far from the nearest junior college, and the larger that junior college is, the less the probability is of choosing the university. The equation suggests also that higher income students tend to choose junior colleges. The one counterintuitive coefficient is for size of nearest university, in which

Table 7

UNIVERSITY VERSUS JUNIOR COLLEGE MODEL:
DEPENDENT VARIABLE = LOGIT P(U|U OR J)

Estimated std dev	6.8664D-01
R squared	0.3766
F	29.299

Variable	Coefficient	T
Constant	3.9715D 00	2.0019
Ability	4.7021D-03	3.9404
Log income	-3.1418D-01	-4.5305
Log distance to nearest university	-2.5496D-01	-7.7561
Log distance to nearest junior college	1.8450D-01	4.2142
Log size of nearest university	-3.3597D-01	-1.6190
Log size of nearest junior college	-9.8948D-02	-1.7102

Table 8

FLORIDA A&M VERSUS JUNIOR COLLEGE MODEL:
DEPENDENT VARIABLE = LOGIT P(F|F OR J)

Estimated std dev	8.0457D-01
R squared	0.6459
F	88.484

Variable	Coefficient	T
Constant	-5.9266D 00	-3.3227
Ability	5.7737D-04	0.1965
Log income	6.6744D-01	4.8144
Log distance to nearest junior college	2.4709D-01	4.8569
Log size of nearest junior college	-1.7234D-01	-2.3013
Log distance to Florida A&M	-4.2684D-01	-11.1966
Percent black	2.0287D 00	3.7827

Table 9

"OTHERS" VERSUS JUNIOR COLLEGE MODEL: DEPENDENT
VARIABLE = LOGIT P(O|O OR J)

Estimated std dev	5.7003D-01
R squared	0.2136
F	19.890

Variable	Coefficient	T
Constant	3.8071D 00	5.2185
Ability	-5.7100D-03	-7.3575
Log income	-1.4948D-01	-2.4062
Log distance to nearest junior college	9.3585D-02	2.6845
Log size of nearest junior college	-1.3842D-01	-3.7928

Table 10

CHOICE AMONG JUNIOR COLLEGES: DEPENDENT VARIABLE
= LOGIT P(NEAREST|NEAREST OR SECOND NEAREST)

Estimated std dev	1.4167D 00
R squared	0.1393
F	23.878

Variable	Coefficient	T
Constant	5.1612D-01	3.9982
Log distance to nearest junior college	-6.4322D-01	-6.9061
Log size of nearest junior college	-5.1151D-02	-0.6194

Table 11

CHOICE AMONG UNIVERSITIES: DEPENDENT VARIABLE
= LOGIT P(NEAREST|NEAREST OR SECOND NEAREST)

Estimated std dev	7.8461D-01
R squared	0.6399
F	262.077

Variable	Coefficient	T
Constant	1.3729D-01	1.5768
Log distance to nearest university	-7.7764D-01	-21.2274
Log size of nearest university	2.1954D 00	13.9098

the sign is wrong. A possible explanation is that the coefficient was simply measured imprecisely, since its t value is only -1.6.

The Florida A&M coefficients (Table 8) suggest that its students come from high income high schools with a high percentage of blacks. High schools that send lower proportions of students are those that are far from Florida A&M, close to the nearest junior college, and for which the nearest junior college is large. Ability showed through as unimportant. We think, however, that this is indicative only of a lack of information in the data about its joint effect with race.

In the choice between junior colleges and "others" (Table 9), ability, income, and size of the nearest junior college are all correlated positively with the probability of going to a junior college, and also the probability is higher as distance gets smaller. These observations are consistent with what we had expected.

Concerning how students distribute themselves within the junior college sector (Table 10), the coefficient on size is nearly zero. Initially, this may seem surprising, but upon reflection it is consistent with the popularly held notion in Florida (supported in the Appendix C counts) that distance is the only major determinant of choice, and size of junior college reflects just local population size.

The university model is shown in Table 11. Size here is important: unlike junior colleges, universities draw statewide, so one might expect that there would be something left to explain once the effect of distance is extracted.

VI. USING THE MODEL

ASSESSING THE ENROLLMENT IMPLICATIONS OF ALTERNATIVE POLICIES

Decisionmakers in higher education are often confronted with the problem of forecasting the enrollment implications of policy alternatives. These forecasts may directly enter the policy decision; or, in the case of decisions made on other grounds, they are needed for planning purposes. In either event, projections are needed of what enrollments are likely to be if the policy alternative is implemented. We discuss a quantitative procedure for projecting the enrollment implications of a specific policy issue--the development of a new institution. We then discuss the steps that must be taken to extend the results to analyses of a broader range of policy issues.

The Enrollment Implications of a New Institution

The decision to develop a new institution or a branch campus of an existing institution is motivated by a need to extend higher education to an area not well served by the existing system. Important considerations in such a decision are the expected enrollment at the new institution and the number of persons enrolling there who, in its absence, would have attended another institution. These are estimates of the extent to which the state's population is better served by the development of the new institution.

Florida opened a new community college, Pasco-Hernando, in 1972. We use our results, from 1971 data, to "predict" the impact of that institution. We begin by assuming that the probability of a student from high school h entering institution i is partly measured by the average effect of the variables examined in the previous section (average ability, average income, location coordinates, etc.), and partly by the deviation from this average which pertains to a particular high school college pair. The latter depends on information that we could not observe, such as whether the high school is accessible by superhighway to a given college, or whether by tradition the school has tended to send a high percentage of students to a given school. Clearly,

both are relevant to estimating the number of students making a particular transition.

We use the model developed in the previous section to obtain the average component. We then define the residual component to be the difference between observed and predicted values in the previous year. Formally, let C_t denote a configuration of schools in year t. For a given high school and institution, compute the average component of the transition probability as $\hat{p}_{hi}(C_{t+1})$. The residual component for year t is

$$N'_{hi}/N_{h.} - \hat{p}_{hi}(C_t) \ ;$$

if institution i did not exist in year t, this quantity is defined to be zero. The new prediction of the transition probability is then

$$\hat{p}_{hi}(C_{t+1}) + \hat{N}'_{hi}/N_{h.} - \hat{p}_{hi}(C_t) \ ,$$

and the estimated number of transitions is simply the expected number of high school h graduates times this quantity. These estimates are then scaled up to reflect the ratios of total to immediate FTIC enrollments and summed by institutions. The procedure is analogous to that described at the end of Sec. IV, above.

This approach was used to project 1972 freshman enrollments in Florida's colleges and universities, based on a prior assumption that the size of Pasco-Hernando would be 200 students.* A prediction was obtained of 384 freshman enrollments at Pasco-Hernando Community College in 1972. Actual freshman enrollments that year were 406. Table 12 provides our projections and actual enrollments at each institution in 1972.

A complete analysis would require an additional set of enrollment projections based on the unadjusted 1971 transition matrix (i.e., using the procedure described at the end of Sec. IV). These projections would represent our estimates of what would have been freshman enrollments at each institution had Pasco-Hernando not been developed. By

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*Recall that the size of a junior college enters into the formulas for $\hat{p}_{hi}$, though without much influence. These same computations, based on a prior assumption of 100 (300) students, yielded an enrollment projection for Pasco-Hernando of 382 (386) students.

Table 12

PROJECTED AND ACTUAL FRESHMAN ENROLLMENTS
BY INSTITUTION: 1972

Institution[a]	Freshman Enrollments	
	Predicted	Actual
FAMU	766	830
FSU	2,102	1,861
FTU	885	781
UF	2,864	2,421
USF	2,111	2,283
State Universities Total	8,728	8,176
BREVARD	3,304	2,741
BROWARD	2,267	3,564
CENFLAJC	510	533
CHIPOLA	415	328
DAYTONAB	1,298	1,151
EDISON	404	645
FLAJCJAC	2,577	2,628
FLAKEYS	281	302
GULFCOAS	640	635
HILLSBOR	1,799	2,335
INDIANRV	632	1,058
LKCITY	383	479
LKSUMTER	593	412
MANATEE	1,390	1,463
MIAMIDAD	8,677	6,796
NOFLAJC	425	304
OKALOOSA	768	688
PBEACHJC	1,731	1,732
PASCOHER	384[b]	406
PENSACOL	1,401	2,257
POLK	1,144	1,193
STJOHNS	519	371
STPETE	3,095	3,216
SANTAFE	1,407	1,581
SEMINOLE	855	717
SOFLAJC	186	200
TALAHASS	677	725
VALENCIA	1,130	1,481
Community College Total	38,892	39,941
All Institutions Total	47,620	48,117

[a]See Appendix B for full names and locations of institutions.

[b]Assuming that statewide ratio of total to immediate FTIC enrollments applies.

comparing them to the projections given in Table 12 we could have estimated the implications of opening the new institution for freshman enrollments at existing institutions. As the procedure is straightforward and the actual numbers uninteresting after the fact, we did not carry out this step in the analysis.

Extending the Analysis to Other Policy Issues

The same approach can be used to analyze the potential enrollment implications of a broad range of policy alternatives, once the relationship between the policy variables and the high-school-to-college transition probabilities have been established. For example, if the relationship between tuition at the state universities and the $\hat{p}_{hi}$'s were known, we could use the following procedure to assess the likely impact of a change in the university tuition level on enrollments by institution. First, project "baseline" enrollments by institution using the transition matrix. Second, project the values of the high-school-to-college transition probabilities given the change in tuition. Third, adjust the estimated transition probabilities to reflect particular high school/college deviations from the average. Next, use the adjusted transition probabilities to project enrollments by institution, assuming the specified change in tuition. Finally, compute the differences between the baseline projection and the projections developed on the assumption that tuition is changed as specified. These differences can be attributed to the change in tuition and thus indicate the enrollment implications of the change.

Resource constraints forced us to restrict this study to a cross-sectional analysis of the 1971 data. As noted earlier, this precluded investigation of the relationships between attributes of institutions, other than distance, and transition probabilities. However, all the data sources employed in this study are available (unchanged) for each year since the early 1960s. The procedure we used to develop the transition matrix for 1971 (see Sec. IV) can be used to develop an analogous transition matrix for each year from the early 1960s to the present. The time series and cross-sectional transition probabilities thereby generated can be pooled in a more elaborate version of the

analysis performed in Sec. V. In addition to the variables we employed, university tuition level, minimum FTGT score required for admission to a state university, measures of the availability of financial aid, and the like can be included in the analysis. The results of this more extensive analysis would provide the information required to assess the likely implications of a broad range of alternative higher educational policies.

MONITORING THE SYSTEM

Higher education has entered a period of considerable uncertainty. Policymakers concerned with their state's higher education system cannot safely assume that past trends in enrollment rates and patterns will continue. Accordingly, they need a means for rapidly identifying problems that may emerge from departures from past trends. The transition matrix provides such a means.

Consider the results displayed in Table 12. The projections given there are estimates of what would have been the distribution of freshman enrollments in 1972 had the 1971 high-school-to-college transition probabilities been maintained, controlling for the enrollment impact of the new community college. The projected freshman enrollment total, 47,620, deviates from actual total freshman enrollments by about 1 percent. This suggests that, overall, there has been no substantial change in the rate at which Florida residents enter public colleges and universities. (Recall that the projections include both immediate and deferred FTIC entrants.)

Freshman enrollments in the state university system are overpredicted by about 6 percent and enrollments at the freshman level in community colleges are underpredicted by about 3 percent. It is possible that this reflects a shift toward the community colleges. That is, some underlying factor has changed between 1971 and 1972 in such a way as to make the community colleges relatively more attractive to potential students. However, students' enrollment decisions have a substantial idiosyncratic component, and random variation from year to year is to be expected. In the absence of time series data, we cannot estimate the interyear random variation in transition probabilities. But we

suspect that these differences are well within the range of what could be considered normal variation. We are thus inclined to believe that there has not been substantial change in the relative attractiveness of universities as compared to community colleges.

Projections for individual state universities tend to be off by roughly 10 percent. We do not know whether or not these differences are sufficiently large to indicate a basic change in students' university-going behavior. Once transition matrices are developed for additional years, the random variation in interyear transition probabilities can be estimated. For now, we must leave open the question of whether students' evaluations of the various state universities have changed.

In the community college sector, on the other hand, there are some large differences between projected and actual freshman enrollments. For example, Miami-Dade realized nearly 1900 fewer freshman than predicted by the 1971 transition matrix. And Broward, located a few miles north in Fort Lauderdale, enrolled about 1300 more freshman than predicted. It appears that these institutions have been affected by fundamental changes in the factors that influence students' college-going behavior. We have no information as to what might have been the nature of these changes, but we have identified two instances where problems may be developing and which should be investigated in depth.

In sum, the matrix can be used to discover where problems in the system may be developing. It does not indicate either the nature of the problem or the factors causing it. But knowing where to ask these questions is the first step toward finding answers.

CONCLUDING REMARKS

We noted, in the Introduction, several of the policy issues that now confront state decisionmakers. Empirical analysis of most of those issues cannot be undertaken in the absence of time series data. Estimation of the impact of the "rate of return" to college on students' college-going decisions, for example, requires data on the enrollment behavior of students confronted by different prospective rates of return. Cross-sectional analyses, which relate enrollment rates to

interstate variations in rates of return, are complicated by variations in higher educational systems and require more resources than are available to state policymakers. And data on intrastate variations in rates of return to college are not available, precluding cross-sectional analysis at the county or high school level.

Despite the need for time series data, or, more accurately, because the need has become urgent only as higher education emerges from an era of rapid growth, states have not developed data systems designed to support analyses of enrollment rates and patterns. On the other hand, states tend to have collected a wealth of information pertaining to high school and college students for a variety of purposes, mainly administrative. In this study, we have attempted to devise methods whereby already available information can be combined to form a data base sufficient for analyses of college-going rates and patterns.

We deliberately restricted ourselves, throughout this analysis, to the use of data that have been collected annually since the early 1960s. Although this effort examined only 1971 data, our procedures can be used to estimate the transition matrix for each year since the early 1960s. The elements of these matrices would constitute a time series which Florida could then analyze to discover the impacts of policy variables (e.g., tuition and admission policies) on enrollment rates and patterns.

Resource constraints forced us to focus this effort on freshman enrollments. However, the general approach can be readily generalized to enrollments at other levels. For example, Florida decisionmakers are especially concerned with the transfer of junior college students to the state universities. The problem of identifying the rate at which students from community college h go on to state university i is analogous to the problem of identifying the rate at which students from high school h go on to college i. And the procedures we used, in Sec. IV, to estimate high-school-to-college transition probabilities can be used to estimate a community-college-to-state-university transition matrix. The elements in that matrix could then be analyzed in the same way as were the elements in the high-school-to-college transition matrix (Sec. V).

Appendix A

1971 FLORIDA HIGH SCHOOLS TABULATED BY COUNTY WHERE LOCATED

COUNTY	IHS	NAME	IHS	NAME	IHS	NAME	IHS	NAME	IHS	NAME	IHS	NAME	IHS	NAME	IHS	NAME
ALACH	01	003 SANTA FE	006	ROLLING	205	GAINESVI	208	P K YONG	244	HAWTHORN	411	NEWBERRY				
BAKER	02	336 BAKER CO														
BAY	03	454 BAY CO H	680	RUTHERFO												
BRADF	04	529 BRADFORD														
BREVD	05	118 ROCKLEDG	122	COCOA HI	172	EAU GALL	351	MERRITT	353	CENTRAL	354	FLORIDA	355	MELBOURN	562	TITUSVIL
		573 HOLLEY-H	689	COCOA BE	690	SATELLIT										
BROWD	06	159 PLANTATI	182	ST THOMA	183	PINE CRE	184	FT LAUDE	188	FERN HAL	189	DILLARD	198	STRANAHA	199	THE MILL
		200 NORTHEAS	201	CARDINAL	203	NOVA SR.	240	MCARTHUR	249	RIVERSID	251	SOUTH BR	255	PALM MAN	471	PALM COV
		472 POMPANO	591	MADONNA	691	CHAMINAD	692	HOLLYWOO	730	NOWLIN O	997	WOODFORD	998	ED CONSU	999	BROWARD
CALHN	07	004 ALTHA HI	049	BLOUNTST												
CHARL	08	481 CHARLOTT														
CITRS	09	136 CRYSTAL	259	CITRUS H												
CLAY	10	217 CLAY JR	293	KEYSTONE	416	ORANGE P	431	ST JOHNS								
COLLR	11	178 EVERGLAD	257	IMMOKALE	409	NAPLES H										
COLUM	12	307 COLUMBIA														
DADE	13	119 RANSOM S	121	CORAL GA	134	DEERBORN	237	HIALEAH	254	SOUTH DA	357	ASSUMPTI	361	MIAMI ED	362	MIAMI JA
		363 MIAMI KI	367	MIAMI MI	368	MIAMI CE	369	MIAMI NO	370	MIAMI SR	371	BELEN JE	372	THE LEAR	373	MIAMI BE
		377 ST PATR	420	NORTH MI	642	ACADEMY	644	LOYOLA S	645	OUR LADY	646	DADE CHR	647	GTR MIAM	648	ST JNO V
		649 MIAMI CO	650	ARCHBISH	652	MIAMI NO	654	EVERGLAD	655	NOTRE DA	657	CHRIS CO	658	IMMACULA	659	ADELPHI
		660 MIAMI SH	661	GABLES A	662	MIAMI CH	663	SOUTHWES	664	MESIVTA	666	MIAMI PA	667	CARROLLT	668	MIAMI SP
		669 MIAMI CA	670	SOUTHWES	672	WESTMINS	673	MONSIGNO	731	FLORIDA	732	THE LEAR	992	DOUGLAS	993	YALE SCH
		994 DREXEL S	995	BASSETT	996	WEST HOL										
DE ST	14	019 DESOTO C														
DIXIE	15	133 DIXIE CO														
DUVAL	16	037 BALDWIN	262	A JACKSO	264	BARTRAM	265	BOLLES H	268	JAX EPIS	269	JAX TECH	271	R E LEE	272	STANTON
		277 BISHOP K	278	D U FLET	279	PAXON SR	284	TERRY PA	285	ENGLEWOO	286	RIVERVIE	287	RIBAULT	700	NATHAN B
		705 SAMUEL W	710	WM M PAI												
ESCAM	17	097 CENTURY	211	J M TATE	457	PENSACOL	460	CATHOLIC	461	WASHINGT	462	UNKNOWN	465	GEO. STO	473	ESCAMBIA
		583 E WARD H	679	W J WOOD	681	PENSACOL	684	PENSACOL	750	PENSACOL	917	BEGGS AD				
FLAGR	18	079 BUNNELL														
FRANK	19	013 APALACHI	091	CARRABEL												
GADSN	20	100 CHATTAHO	220	GREENSBO	241	HAVANA H	483	ROBT F M	484	JAMES A						
GILCH	21	046 BELL HIG	565	TRENTON												
GLADE	22	354 MOORE HA														
GULF	23	478 PORT ST	601	WEWAHITC												
HAMIL	24	280 HAMILTON														
HARDE	25	586 HARDEE C														
HENRY	26	115 CLEWISTO	301	LABELLE												
HERNO	27	076 HERNANDO														
HIGHL	28	029 UNKNOWN	031	AVON PAR	310	LAKE PLA	517	SEBRING								
HILLS	29	064 BRANDON	324	PINECRES	469	PLANT CI	544	ACADEMY	547	HENRY B	548	TAMPA BA	550	HILLSBOR	551	UNKNOWN
		553 ROBINSON	554	JESUIT H	555	SACRED H	558	BLAKE	561	CHAMBERL	564	LEON KIN	567	BERKELEY	568	TURKEY C
		569 TAMPA CA	572	LETO COM	610	EAST BAY	720	TEMPLE H								
HOLMS	30	052 BETHLEHE	055	HOLMES C	215	POPLAR S	475	PONCE DE								

COUNTY	IHS	NAME	IHS	NAME	IHS	NAME	IHS	NAME	IHS	NAME	IHS	NAME	IHS	NAME	IHS	NAME
IND R	31	577 VERO BEA														
JACKN	32	124 COTTONDA	214	GRACEVIL	218	GRAND RI	226	GREENWOO	343	MALONE H	344	UNKNOWN	346	MARIANNA	523	SNEADS H
JEFFN	33	391 JEFFERSO														
LAFAY	34	352 LAFAYETT														
LAKE	35	112 CLERMONT	175	EUSTIS H	179	VOCATION	229	GROVELAN	246	HOWEY AC	322	LEESBURG	388	THE MONT	396	CHRISTIA
	397	MT DORA	527	FLA CENT	559	TAVARES	570	HARRY AN	571	UMATILLA						
LEE	36	007 ALVA	190	FT MYERS	204	CYPRESS	675	NO FT MY	676	BISHOP V						
LEON	37	534 N FLA CH	537	FLORIDA	538	JAS RICK	539	GODBY JR	541	LEON HIG	543	FLA A &				
LEVY	38	075 BRONSON	094	CEDAR KE	103	CHIEFLAN	607	WILLISTO								
LIBER	39	073 LIBERTY														
MADIS	40	223 GREENVIL	337	MADISON												
MANTE	41	062 MANATEE	468	PALMETTO	525	SOUTHEAS	985	NICHOLSL								
MARIN	42	169 DUNNELLO	329	MCPHERSO	413	GOLDEN H	427	FOREST H	487	NORTH MA	536	LAKE WEI	693	VANGUARD	986	MATTHEWS
MARTN	43	532 MARTIN C														
MONRO	44	288 MARY IMM	292	KEY WEST	341	MARATHON	560	CORAL SH								
NASAU	45	085 WEST NAS	181	FERNANDI												
OKALO	46	034 BAKER HI	130	CRESTVIE	321	LAUREL H	418	NICEVILL	522	CHOCTAWH						
OKEEC	47	436 OKEECHOB														
ORANG	48	016 APOPKA M	350	CENTRAL	421	COLONIAL	422	EVANS HI	424	OAK RIDG	429	EDGEWATE	432	BOONE HI	433	OCOEE HI
	441	JONES HI	446	BISHOP M	613	LAKEVIEW	617	TRINITY	618	PLATTS A	619	WINTER P	620	WYMORE T	624	HAMPDEN
	677	LAKE HIG	848	MID FLOR	991	ORLANDO										
OSCEO	49	298 OSCEOLA	496	ST CLOUD												
P BCH	50	047 GLADE CE	051	BOCA RAT	166	ATLANTIC	289	JUPITER	311	P BCH CO	314	LAKE WOR	317	JOHN I L	445	PAHOKEE
	450	PALM BEA	476	SUNCOAST	495	DAY SCH.	588	PALM BCH	595	TWIN LAK	596	ROSARIAN	597	PALM BCH	598	CARDINAL
	599	FOREST H	600	NORTH SH	674	ST ANDRE										
PASCO	51	139 PASCO CO	412	GULF HIG	622	ZEPHYRHI										
PINEL	52	108 CLEARWAT	109	CLEARWAT	171	DUNEDIN	258	NINA HAR	318	SEMINOLE	319	LARGO HI	492	BISHOP B	494	NOTRE DA
	497	NORTHEAS	501	GIBBS HI	502	ST PETER	504	ADMIRAL	507	DIXIE HO	510	BOCA CIE	556	TARPON S		
POLK	53	025 AUBURNDA	043	BARTOW S	187	FORT MEA	202	FROSTPRO	232	HAINES C	291	KATHLEEN	306	SANTA FE	313	LAKE WAL
	316	LAKELAND	403	MULBERRY	616	WINTER HI										
PUTNM	54	127 CRESCENT	358	INTERLAC	447	PALATKA	448	PALATKA								
S JHN	55	238 HASTINGS	490	ST AUGUS	493	ST JOSEP	876	FLA SCH								
S LUC	56	192 JOHN CAR	193	FT PIERC												
S ROS	57	230 GULF BRE	283	JAY HIGH	382	ALLENTOW	383	CHUMUCKL	385	MILTON H	386	SANTA RO	406	MUNSON HI		
SARAS	58	514 SARASOTA	519	RIVERVIE	521	PREW SCH	524	CARDINAL	580	VENICE H	988	ORANGE A	989	SARASOTA	990	LAUREL S
SEMIN	59	328 LYMAN HI	340	FOREST L	442	OVIEDO H	509	SANFORD	511	SEMINOLE						
SUMTR	60	083 SOUTH SU	604	WILDWOOD												
SUWAN	61	067 BRANFORD	325	SUWANNEE												
TAYLR	62	463 TAYLOR C														
UNION	63	304 UNION CO														
VOLUS	64	148 MAINLAND	151	SEABREEZ	154	FATHER L	163	DELAND H	167	FLA MIL	415	NEW SMYR	466	T DEWITT		
WAKUL	65	125 WAKULLA														
WALTN	66	160 WALTON C	455	PAXTON H	682	FREEPORT										
WASHN	67	106 CHIPLEY	574	VERNON H												

Appendix D

FLORIDA'S INSTITUTIONS OF HIGHER LEARNING

Name	Abbreviation	Location
State University System		
Florida Agricultural and Mechanical University	FAMU	Tallahassee
Florida State University	FSU	Tallahassee
Florida Technological University	FTU	Orlando
University of Florida	UF	Gainesville
University of South Florida	USF	Tampa
Public Community and Junior Colleges		
Brevard Community College	BREVARD	Cocoa
Broward Community College	BROWARD	Fort Lauderdale
Central Florida Community College	CENFLAJC	Ocala
Chipola Junior College	CHIPOLA	Marianna
Daytona Beach Community College	DAYTONAB	Daytona Beach
Edison Community College	EDISON	Fort Myers
Florida Junior College at Jacksonville	FLAJCJAC	Jacksonville
Florida Keys Community College	FLAKEYS	Key West
Gulf Coast Community College	GULFCOAS	Panama City
Hillsborough Community College	HILLSBOR	Tampa
Indian River Community College	INDIANRV	Fort Pierce
Lake City Community College	LKCITY	Lake City
Lake-Sumter Community College	LKSUMTER	Leesburg
Manatee Junior College	MANATEE	Bradenton
Miami-Dade Junior College	MIAMIDAD	Miami
North Florida Junior College	NOFLAJC	Madison
Okaloosa-Walton Junior College	OKALOOSA	Niceville
Palm Beach Junior College	PBEACHJC	Lake Worth
Pasco-Hernando Community College	PASCOHER	Dade City
Pensacola Junior College	PENSACOL	Pensacola
Polk Community College	POLK	Winter Haven
St. Johns River Junior College	STJOHNS	Palatka
St. Petersburg Junior College	STPETE	St. Petersburg
Santa Fe Junior College	SANTAFE	Gainesville
Seminole Junior College	SEMINOLE	Sanford
South Florida Junior College	SOFLAJC	Avon Park
Tallahassee Community College	TALAHASS	Tallahassee
Valencia Community College	VALENCIA	Orlando

Appendix C

1971 ESTIMATED HIGH-SCHOOL-TO-COLLEGE TRANSITIONS

COUNTY	HS NAME	UNIVERSITIES: FAMU	UF	USF	FSU	JUNIOR COLLEGES: FTU	BREVARD	CENFLAJC	CHIPOLA	DAYTONAB	EDISON	FLAJAC	FLAKEYS	GULFCOAS	HILLSBOR	INDIANRV	BROWARD	LKCITY	LSUMTEB	MANATEE	MIAMIAD	NOFLAJC	OKALOOSA	PBEACHJC	PENSACOL	POLK	STJOHNS	STPETE	SANTAFE	SEMINOLE	SOFLAJC	TALHASSA	VALENCIA	OTHER	TOTAL
ALACH 01	1003 SANTA FE	0	6	1	0	0	0	2	0	0	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	33	0	0	0	0	621	121
	1006 ROLLING	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	8
	1205 GAINESVI	21	138	1	23	2	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	7	64	10	0	0	1	0	3621	958
	1208 P K YONG	0	25	2	3	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	331	89
	1244 HAWTHORN	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0	22	0	0	0	0	371	64
	1411 NEWBERRY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	19	0	0	1	0	691	90
BAKER 02	1336 BAKER CO	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1281	153
BAY 03	1454 BAY CO HI	5	13	0	18	0	0	0	1	0	0	0	0307	0	0	0	1	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	2221	572
	1680 RUTHERFO	0	4	0	0	0	0	0	0	0	0	0	0187	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	1931	389
BRADF 04	1529 BRADFORD	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	6	0	41	0	0	0	0	1511	211
BREVD 05	1118 ROCKLEDG	11	9	4	10	2	202	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	611	299
	1122 COCOA HI	0	0	0	0	0	263	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	531	317
	1172 EAU GALL	0	10	0	6	6	309	0	0	0	0	0	0	0	0	0	0	1	0	0	6	0	0	0	1	0	0	17	0	0	0	0	1211	479
	1351 MERRITT	0	25	4	3	2	331	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	851	451
	1353 CENTRAL	0	5	7	0	0	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	101	70
	1354 FLORIDA	0	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	221	57
	1355 MELBOURN	4	33	13	30	11	335	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1181	546
	1562 TITUSVIL	0	31	22	10	39	403	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	1261	637
	1573 HOLLEY-HI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	91	9
	1689 COCOA BE	0	22	0	8	4	184	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	2	0	0	0	0	0	0	0	0	461	270
	1690 SATELLIT	0	21	37	13	7	322	0	0	3	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	1101	510
BROWD 06	1159 PLANTATI	0	24	8	19	0	0	0	0	0	0	0	0	0	0	0	223	0	0	0	0	0	0	4	1	0	2	0	17	0	0	0	3841	682
	1182 ST THOMA	6	9	0	6	0	0	0	0	0	0	0	0	0	0	0	47	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	681	137
	1183 PINE CRE	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	961	116
	1184 FT LAUDE	0	25	14	27	0	0	0	0	0	0	0	0	0	0	0	202	0	0	0	0	0	0	1	0	0	0	0	4	0	0	0	3901	663
	1188 FERN HAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	121	12
	1189 DILLARD	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1831	222
	1198 STRANAHA	5	7	0	15	0	0	0	0	0	0	0	0	0	0	0	194	0	0	0	20	0	0	1	0	0	0	1	0	0	0	0	4571	700
	1199 THE MILL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	151	17
	1200 NORTHEAS	4	57	5	4	0	0	0	0	0	0	0	1	0	0	0	183	2	0	0	0	0	0	4	1	0	1	1	16	0	0	0	3521	631
	1201 CARDINAL	0	24	22	19	0	0	0	0	0	0	0	0	0	0	0	52	0	0	0	0	0	0	7	0	0	0	1	0	0	0	0	861	211
	1203 NOVA SR.	0	19	13	9	5	0	0	0	0	0	0	0	0	0	0	149	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2361	432
	1240 MCARTHUR	5	30	3	31	0	0	0	0	0	0	0	0	0	0	0	153	0	0	0	31	0	0	0	0	0	0	0	0	0	0	0	4821	735
	1249 RIVERSIDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	241	26
	1251 SOUTH BR	8	20	19	4	3	0	0	0	0	0	0	0	0	0	0	109	0	0	0	44	0	0	1	0	0	0	0	9	0	0	0	3891	606
	1255 PALM MAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	111	11
	1471 PALM COV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	4	0	0	0	171	24
	1472 POMPANO	0	19	14	23	0	0	0	2	0	0	0	0	0	0	0	175	0	0	0	0	0	0	29	0	0	0	0	5	0	0	0	6311	898
	1591 MADONNA	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	19	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	391	91
	1691 CHAMINAD	0	14	5	5	0	0	0	0	0	0	0	0	0	0	0	33	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	481	135
	1692 HOLLYWOO	0	18	18	15	0	0	0	0	0	0	0	0	0	0	0	142	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	3661	580
	1730 NOWLIN O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	151	15
	1997 WCODFORD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	4
	1998 ED CONSU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	4
	1999 BROWARD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	3
CALHN 07	1004 ALTHA HI	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	171	25
	1049 BLOUNTST	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	581	90

| COUNTY | HS NAME | UNIVERSITIES | | | | JUNIOR COLLEGES | | | |

| COUNTY | IHS | NAME | UNIVERSITIES | | | | JUNIOR COLLEGES | | | |

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